European Perceptions on Crowdfunding for Renewables

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European Perceptions on Crowdfunding for Renewables: Positivity and Pragmatism

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1. Introduction

This paper sets outs findings from the first detailed survey of public perceptions about the potential of crowdfunding for renewable energy project (REP) investments in Europe. Crowdfunding is a relatively recent form of business finance, with most providers having entered the market within the past ten years, including in Europe, where the market has grown from €1.12bn in 2013 to €10.44bn in 2017 (Ziegler et al., 2019). Extensive knowledge now exists regarding the structure and role of the European crowdfunding market in general (see, e.g., Baeck et al., 2014; Wardrop et al., 2015), but public attitudes regarding its role, operations and potential have not been explored in depth. A particular gap in knowledge exists regarding perceptions around the crowdfunding of REPs and this requires addressing given the close link between the communitarian underpinning of this type of financing vehicle and the priorities of many proponents of REPs (Rogers et al., 2012; Cumming et al., 2017).

The implications of this lack of understanding have been thrown into sharp relief by Europe-wide governmental cutbacks in support for the renewables sector (ETN Global, 2017; Goreham, 2018) which have occurred alongside continuing difficulties for an entrepreneurial finance market still recovering from the global financial crisis of 2008 (Cosh et al., 2009; Irfan, 2018). While renewable investments have typically involved projects in large scale investments beyond the reach of many of the continent's existing crowdfunding platforms, Jennings and Govinder (2019) note that: "smaller projects around the 5MW mark are becoming increasingly attractive to development finance institutions as they generate deal flow and often have less red tape" (p .1) In addition, despite a low base, Klaes (2018) reports that by 2017 crowdfunding platforms had begun to contribute to larger European REPs, even where start-up costs exceed €10M, with more than

1,000 individual investors often involved. Klaes acknowledges, however, that: “clearly, we are not yet in the reach of the lot sizes that are of interest to most institutional investors.” (p. 5). Thus, while the alternative financing sector has a strong prospective role in REPs, with total project financing for the latter reaching €42.7bn in 2017 (WindEurope, 2018), only around €300m of this total was provided via crowdfunding (Candalise, 2018) suggesting a significant potentiality gap. The present study investigates public opinions in Europe about the prospective role of crowd-sourced investment in nurturing the renewables sector against a backdrop of compromised public support. The next section of the paper reviews the prior literature of most relevance to the study before, in Section 3, we discuss the rationale underpinning the survey design and broader methodology. Section 4 then presents the empirical findings, before we close in Section 5 with a discussion of the results, including reflection on their implications in terms of the part that crowdfunding can play in developing Europe’s renewables sector going forward.

2. Prior Literature

2.1 Conceptualisation and Context

Crowdfunding is part of the broader “alternative” finance market, where money is provided by individual members of society brought together by dedicated platforms, increasingly social media-based, to fund specific investment projects (Wardrop et al., 2015). Although this general understanding of the broad notion now appears to be pervasive, no standard definition of the term “crowdfunding” has emerged, with a recent report on European market activity by Ziegler et al. (2019, p. 31) reporting that 13[1] distinct types of alternative financing vehicles can now be identified. Contemporary discussions about crowdfunding is typically sited in the earlier crowdsourcing and micro-finance literature of Howe (2008), Kleeman et al. (2008) and others,

(see, e.g., Belleflame et al., 2014), with an emphasis on its importance for start-up ventures seeking external capital for the first time (Carpenter and Peterson, 2002; Bruton et al., 2015).

A number of recent studies have explored crowdfunding activity in the context of earlier attempts to develop understanding of entrepreneurial processes. For example, Gutierez Urtiaga and Saez–Lacave (2018)'s investigation of contractual issues relating to reward crowdfunding characterises the latter as an: "example of the new forms of small financing that have developed since the 1980s" (p. 355), pointing to its inherent microfinance and fintech properties. Belleflame et al. (2014) acknowledge these legacies, but emphasise the participative online foundation of modern practices, arguing that the main objective of crowdfunding in the digital age is to: "collect money for investment, generally by using online social networks," permitting fundraising spread across large crowds, rather than requiring tapping of: "a small group of sophisticated investors" (p. 586). Indeed, virtually all modern formulations of the crowdfunding notion emphasise the digital context; for example, Valančienė and Jegelevičiūtė (2014) suggest that it facilitates: "connection between entrepreneurs, who aim to raise capital, and novel investors, who form an emerging source of capital and are willing to invest small amounts, through internet-based intermediaries" (p. 601).

2.2 Outcomes and Processes

In addition to setting out structural concepts, recent academic literature on crowdfunding has focussed on a range of outcome- and process-based matters including descriptions of practical outcomes, choice modelling via game theory-based analysis and issues such as market structure, regulation and other practicalities - often restricted to demand-side concerns relating to particular financing forms. Early studies by Agrawal et al. (2011 and 2012) demonstrate the role of both

empirical investigation and theoretical modelling in generating insights about market potential. Agrawal et al. (2011) report that geographically remote capital providers' tend to become involved at a late stage in the process, heavily influenced by other investors' behaviour, whilst Agrawal et al. (2013) predict that market forces will drive the innovation needed to foster an efficient equity crowdfunding landscape, albeit with some regulatory iteration required. More recently, Belleflame et al. (2015) highlight the need for funders to engage in non-equity market development activity, in the context of real-world finance gaps. In this regard, Mollick (2014) argues that social capital, preparedness and geography all play a role in shaping outcomes for reward- and donation- based funding; while the majority of projects proceed to completion serious delays are common, often as a result of overfunding. In contrast, when equity-based crowdfunding is being considered, Ahlers et al. (2017) find that social and intellectual capital have little impact on the likelihood of fund raising success, with human resources often the decisive enabling factor.

An alternative perspective is offered by Belleflame et al. (2014), who demonstrate that entrepreneurs are likely to prefer profit-sharing over pre-ordering when relatively large amounts of capital are involved, with results reflecting the extent to which private benefits are achievable in alternative funding scenarios. Indeed, a number of recent theoretical and empirical studies relating to potential outcomes across particular types of crowdfunding suggest that the likelihood of success can be affected by the specifics of the vehicles employed. For example, Gutierez-Urtiaga and Saez–Lacave (2018) employ game theory logic to illustrate the potential role of "no-penalty" contracts in maximising the benefits of reward-based crowdfunding. Drawing on earlier theoretical analysis of possible outcomes that endogenise information revelation behaviour and real option availability,[2] the analysis suggests that the ability of penalty-free arrangements to

maximise talent discovery means that contracts of this nature should be protected from consumer regulation. In terms of the relative strengths of alternative platform types, Walthoff-Borm et al. (2018) reveal that in the UK equity-based crowdfunded ventures have failure rates more than eight times higher than those of otherwise matched entities that employ alternative crowdfunding devices. The equity-based initiatives are also found to have higher patent application rates, particularly when financed through direct ownership, but these generate large losses relative to cases where equity is held on a nominee basis. Outcomes in equity-based vehicles are also the focus of a cross-border study by Hornuf et al. (2018), who report that German firms employing such funding are more likely than their UK counterparts to attract later-stage financing from venture capital firms and business angels, particularly when initial interest from such parties was substantial. Although the failure rate in these cases is demonstrated to be relatively high, the impact is lessened when senior management numbers are minimal and prior equity crowdfunding activity is significant.

2.3 Crowdfunding and Renewable Energy Projects

Prior studies of the role of crowdfunding in the renewables sector have emphasised the pragmatic benefits of such vehicles around green energy investments, but without explicitly investigating supply-side views (in the present case individual European citizens as potential financiers). For example, Candelise (2018) explores the role of European crowdfunding platforms in the context of REPs and emphasises their potential in providing "access to a wider audience of potential investors," as well as increasing levels of awareness and acceptance while reducing "nimbyism" and "planning risks," and redistributing income streams to "affected" locations (p. 4). Bonzanini et al. (2016) provide case study evidence regarding the use of alternative financing in REP settings

across 13 platforms based in Europe and the Americas. The study emphasises that this type of funding vehicle can facilitate risk reduction and sharing, thus enabling small investment projects that professional investors are often biased against because of the fixed cost element in due diligence activity. As in Candelise's work, Bonzanini et al. note the opportunity that crowdfunding and other alternative financing models provide to overcome hostility on the ground, by involving local communities at all stages in the projects concerned and thereby helping "to foster the effective implementation of renewable energy plants" (p. 430). An alternative perspective is offered by Cumming et al. (2017) who, drawing on evidence from across more than 80 nations, suggest that the propensity and determinants of success in "cleantech" crowdfunding differ from those for other projects. In particular, macro-issues such as global oil prices impact relatively strongly on the popularity of environmentally-oriented undertakings, with outcomes for the latter closely-linked to practicalities (such as campaign size) that reflect the need for risk attenuation in these investments. Similarly, Nigam et al. (2018), in a study of 30 crowdfunding platforms across six European nations and the US, report that a range of practical benefits are relevant in driving sectoral growth, notably scale and speed, as developers focus on project "specificities" (p. 33) in determining routes forward. An earlier study by Boon and Dieperink (2014) employs literature analysis and interviews with six experts to explore a range of hypotheses relating to 26 local renewable energy organisation developments in the Netherlands, initiatives with operational characteristics that share many key features with crowdfunded REPs. The results indicate that more than 20 identifiable factors impact on project outcomes, with a range of pragmatic issues again found to be significant including cost, co-ownership structure and relative benefit distribution. Finally, De Broeck (2018) reports findings from a survey of 23 European crowdfunding platforms. In line with the earlier studies, the evidence suggests that a range of

practicalities (including concerns about tariffs and risk reduction potential) are particularly important.

Whilst the studies above have generated important insights about the role of alternative funding vehicles in the context of environmentally-oriented investment projects, common to all of these analyses is a focus on market-wide review and an emphasis on the opinions held by - and the potential role of - platform developers and project initiators. Our study represents a substantive contribution to this literature by providing the first detailed evidence regarding the public's (i.e. the potential suppliers of funding) perspectives. In so doing, we present novel findings about the extent to which the experienced practicalities and advantages of crowdfunding in an REP context manifest themselves in tandem with the cognitive, emotion-driven association of the spirit and ethos of the two issues. This gap in understanding is potentially significant in the case of REPs given that these enterprises are often characterised as being driven by a similar set of motivations to crowdfunding activity, i.e. community-led concern about the ethics and morality of economic progress that places limited emphasis on overall societal welfare. For example, Rogers et al. (2012) - drawing on Walker et al.'s (2007) analysis of governmental initiatives that emphasise local community engagement in renewables[3] - characterise such investment as involving: "some form of public participation … and/or the intention to deliver local and collective benefits" (p. 240). Similarly, Brabham (2008, p. 87) links the need to: "apply the best principles to the non-profit world in the fight for social and environmental justice" to the potential of crowdsourced funding, particularly in situations where otherwise: "altruism may be lacking."[4] The more recent work of Candelise (2018) and Cumming et al. (2017) described above also point to cognitive overlap in this regard. Candelise argues that crowdfunding: "… could provide an additional source of finance,

by allowing to raise capital from diffused investors, potentially more willing to accept lower or slower rate of returns on the investment in exchange of recognizable social and environmental benefits," whilst pointing to the "the engagement, participation and communication function of crowdfunding" in the context of social and environmental benefits around district heating projects - as well as its potential in reducing "negative perceptions" on the part of customers (p. 5). Similarly, Cumming et al. (2017) suggest that "'Cleantech' projects are characterized as encompassing a public good with positive externalities in terms of a cleaner environment" (p. 292), while noting that crowdfunding emphasises similar goals such as: "the extent to which … projects solve social and environmental problems" (p. 293). The present study therefore investigates opinions regarding the role of crowdfunding for REPs in Europe - including exploration of potential determinants of any cognitive association of crowdfunding with REP investments - over a period when, as noted above, governmental support for the sector remains lukewarm.

3. Methodology and Approach

A questionnaire survey was employed to access public perceptions regarding the use of crowdfunding for REPs, with a focus on perceived benefits, difficulties and potentialities. An initial draft of the questionnaire was circulated at a workshop of 14 European crowdfunding platforms, REP developers and other interested partners[5] to check for relevance. Structured feedback gathered from this workshop fed into pilot drafts of the English version of the questionnaire which were sent to personal contacts of the parties in April 2015 to check for semantic consistency.[6] The survey was administered via a SurveyMonkey weblink that was live from 15th June 2015 to 15th June 2018. This lengthy period was chosen to ensure that a relatively settled impression of European public perceptions was reflected rather than results being

dominated by the short-term influence of inter-temporal vagaries in market regulations across the continent (outlined in Aschenbeck-Florange and Dlouhy, 2015 and Ziegler et al. 2019), whilst ending prior to the increase in 'Brexit'-related uncertainty that followed the emergence of the UK Government's 'Chequers plan' in July 2018.[7] A snowballing process was employed for dissemination, with all parties involved in the preliminary checking process asked to circulate details about the survey via their social networks. No prior specific knowledge regarding crowdfunding was assumed as, for reasons noted below, the manner in which prior awareness influenced responses was one of the main issues examined via the empirical work. However, to determine the extent of any non-response bias, the mean responses from the final one-third of the sample were compared with those generated by the first two-thirds for each of the 17 quantitative questions (those summarised in Tables 5-9 below).[8] The resultant statistical tests indicated that there were no significant differences in any cases at the 10% level.[9]

As highlighted earlier, there is overlap in the communitarian ethos underpinning both crowdfunding and the renewable energy sector. However, the analogous nature of the motivations suggests that two possible drivers of perceived links between funding method and purpose - with differing implications for those concerned with associated outcomes - exist. First, it is possible that any perceived link between the crowdfunding process and REPs solely reflects desires for vehicles that reflect the ethical positioning of renewable energy investments (Rogers et al., 2012). Statman (2017) contends that there need be no question of irrationality in such cases, instead arguing that is entirely "normal" for individuals to desire the satisfying of "emotional"[10] and "expressive"[11] wants. Of particular relevance to the present study, Statman suggests that "staying true to our values" (p. 18) satisfies both emotional and expressive desires, while Burbano (2016) provides

explicit experimental evidence that the satisfaction of social responsibility concerns can lead to a reduced focus on purely financial outcomes. It may, therefore, be entirely normal for some individuals to embark on behaviour (e.g. investing in REPs via community-based funding as per Bonzanini et al., 2016) that fails to maximise financial returns because of the social-orientation common to both undertakings described in Section 2.3. This reasoning is in line with the notion of a desire for "warm-glow" benefits described by Allison et al. (2013) in the context of micro-lending activity, where the dominant motivation is a need to: "help others in order to feel good about their [the lenders'] contributions" (p. 691). In this sense, emotional and expressive wants adhere to the pleasure principle generally ascribed to rational agents in the behavioural literature (Wilkinson and Klaes 2018, p. 145).

Second, it is apparent from the logic employed in a number of studies that engagement in crowdfunding for REPs might also be driven by pragmatic benefits - in this case relating to the suitability of the vehicle itself - and therefore experienced in practice by those engaged in such prior activity. Weston (1985), while acknowledging that: '''pragmatism' sounds like just what environmental ethics is against: short-sighted, human-centred instrumentalism," suggests that any such conceptualisation can be disputed and instead, when proper means-end distinction is made, natural resource-related issues and matters related to practicality are not necessarily incompatible. Weston argues that by allowing for a shift in paradigm from an emphasis on fixed ends to an approach that stresses the inter-relatedness of value systems, concern regarding the pragmatics of particular outcomes facilitates recognition of an "ecology of values." Review of Minteer and Manning's (1999) study indicates that within a decade recognition of this principle was underway and that: "many environmental ethicists have begun to advocate a more pragmatic, pluralistic, and

policy-based approach in philosophical discussions about human-nature relationships" (p. 191). Minteer et al. (2004, p. 133) develop this line of reasoning in noting that: "environmental ethicists have attempted to inject either explicit or tacit pragmatic elements into the field's discourse" implying in turn that: "ethicists must rethink and retool many of their philosophical commitments and practices along more pragmatic lines in order for the field to contribute more effectively to environmental and natural resource problem solving and policy formulation." Empirical evidence regarding the role of practical experience in motivating behaviour consistent with macro-level concerns for energy consumption is provided in Rocah et al. (2019). On the basis of an analysis of pre-payment energy meters in the UK, the authors report that: "a household who has already experienced self-disconnection has a greater probability of accepting a saving plan" (p. 282), with implications for policy-led efforts to improve consumption planning. It is also apparent from the findings in the studies cited in Section 2.3 above that engagement in crowdfunding for REPs is seen as having a range of pragmatic benefits (such as cost and efficiency), awareness of which will, by their very nature, require direct practical experience of the processes involved. However, as this literature exclusively focusses on outcomes from a platform and project developer perspective, the views of investors in these contexts has yet to be fully investigated; we therefore examine the extent to which the (supply-side) perceptions of the 'crowd' itself - in this case EU citizens - are influenced by the extent of prior practical engagement with such ventures. The methodology is explicitly designed to permit identification of the extent to which both: (i) the ethical and emotional benefits alluded to earlier; and (ii) the pragmatic advantages of crowdfunding for REPs, co-exist in potential funders' thinking, by incorporating the extent of prior practical experience of these initiatives into the empirical set-up.

Three experiential indicators are therefore employed, reflecting whether or not respondents: (i) are familiar with the notion of crowdfunding; (ii) have previously invested via crowdfunding; and (iii) have previously invested in REPs via crowdfunding. Examination of differences in opinions across the three groups will provide an indication of the extent to which practical, pragmatic benefits - witnessed by virtue of experience - exist over and above any ethos-driven links between the projects and funding vehicles that might logically be held irrespective of prior involvement and engagement with the processes involved. Inspection of Table 1 reveals that by the end of the survey period, 637 responses had been received. However, several of those who logged into the survey did not complete any questions other than indicating a desired choice of language and indicating agreement with the terms and conditions; 164 (or 25.7%) of the responses were removed from the sample on this basis.[12] This elimination left a total of 473 responses, 233 in English, 104 in French, 95 in German and 41 in Dutch. Responses were received from 30 different countries, with the largest proportion of the sample coming from France (with 72 useable responses) followed by Germany (36) the Netherlands (30), Austria (29), the United Kingdom (25), Belgium (20) and Ireland (14). Thus, the predominance of the United Kingdom in terms of alternative financing practice (cf. Ziegler et al. 2019, p. 22) did not prevent a wide sample of views - characterised in either linguistic or geographical terms - being accessed.[13]

4. Results

4.1 Demographics and Prior Familiarity/Engagement with Crowdfunding

The first part of the questionnaire enquired about respondents' experience of and familiarity with crowdfunding in general and in the context of REPs. As inspection of Table 2 indicates, 86.2% of respondents were familiar with the broad crowdfunding notion, 45.5% of whom had invested via

such platforms previously, with just under 50% of these having invested specifically in REPs on this basis. Of the latter, most (30) had been involved in a single project, although 21 had invested in at least five. Table 2 also documents the scale of the most recent investments in REPs made by respondents. The figures range from nine investments of less than €100 to one investment of between €25,000 and €50,000. The most common range was €100 - €500 but the mean amount committed, based on mid-points, was €2364 suggesting that the typical engagement in REPs by European retail investors is on a non-trivial scale.

4.2 Future Intentions regarding Crowdfunding for Renewable Energy Projects

The questionnaire next sought to explore future intentions regarding the use of crowdfunding for REPs, contextualised by the information gathered regarding prior engagement and awareness. Inspection of Table 3 indicates that 40.3% of the sample planned to invest in REPs via crowdfunding over the next three years, with the figure rising to 60.8% for those with prior experience of crowdfunding in general and to 81.3% for those who had previously employed crowdfunding in the context of REPs. This pattern suggests that the extent of familiarity is linked with positivity regarding crowdfunding for renewables and is consistent with the proposition that the latter type of activity generates experiential pragmatic benefits – evidence that might be viewed as encouraging in the light of continent-wide reductions in governmental support for the sector. Of particular note in this regard is the evidence that only 4% of respondents who had previously used crowdfunding in a REP context indicated that they did not intend doing so again over the next 36 months.

4.3 Factors Relevant to Investment in Renewable Energy Projects

Table 4 reveals the wide range of factors reported by large numbers of respondents as being relevant when considering investment in REPs.[14] Inspection of the table reveals the diverse range of benefits attested to, with eight factors being identified by more than 100 respondents. Amongst these "Transparency" was cited most often (on 246 occasions) followed by "Sustainability impact" (202). To assess the extent to which the responses reflected informed knowledge of the process, the figures generated by those who intend to invest in REPs via crowdfunding over the next three years are also shown in Table 4. This data provides a very similar picture to that conveyed by the whole sample results suggesting that differences identified later in the study regarding the impact of prior experience on opinions do not reflect fundamental differences in understanding of the practices and processes involved. Those completing the questionnaire were given the option to add additional comments in relation to this part of the survey and 47 responses were received.[15] Whilst these covered a wide range of issues including project feasibility, tax status and governance, most related to the broad issue of community/environmental impact and ethics. In one case, the view was contextualised in terms of project financing, viz: "The social impact of the project would have a big influence on my decision – provided it made economic sense."

4.4. Crowdfunding Method Preferences

The survey next explored opinions regarding the most appropriate crowdfunding method for REP investments. The three most-commonly identified methods in the broad crowdfunding literature (equity; reward; donation) along with debt - the other dominant form of alternative financing in Europe (Ziegler et al. 2019)[16] - were employed and respondents asked to rank these in order of preference from 1 to 5 where 1 indicated the highest preference.

Inspection of Table 5 reveals the perceived primacy of equity, with an overall mean rank of 2.46 followed by peer-to-peer debt (2.85) and bonds (3.01). Despite the dominance of debt-based vehicles reported in Baeck et al. (2014) and Ziegler et al. (2019) for investment projects as a whole, the preference for equity-based crowdfunding reported here indicates that a lack of fixed interest repayments is not seen as a major problem in a REP context. However, the disaggregated data again provide further evidence that practical experience impacts on views; contrary to the evidence for other sub-groups, respondents who had previously invested in REPs via crowdfunding generating higher means for the two debt-based forms of financing than for the equity model. This pattern in preferences suggests that the security of formalised lending attains a level of importance for crowdfunded REPs in practice that is not shared by those without this experience and thus appears to be entirely pragmatic in nature. The survey document allowed respondents to add additional comments about influences on crowdfunding method preference and these suggested[17] that a wide range of issues is relevant including project risk, environmental impacts, cost implications, timescale, investment site (i.e. local or wider) and project size.

4.5 Crowdfunding as a Viable Alternative to Traditional Finance

The questionnaire proceeded by investigating the extent to which crowdfunding is viewed as a meaningful alternative to traditional financing. Inspection of the results in Table 6 suggests that an overwhelmingly positive view of crowdfunding exists across Europe, with an overall mean response of 4.11 suggesting strong support for its viability. However, the data also provide the first indication that crowdfunding is seen as particularly appropriate for REPs, with a significantly higher[18] mean response in this context of 4.32. The disaggregated data suggest that this pattern holds irrespective of respondents' prior experience of/familiarity with crowdfunding; eight of the

nine sub-group means are higher for investments in renewables, with six of these significant including all four cases where respondents answered “yes” to questions relating to familiarity and engagement with the processes concerned. Encouragingly for the sector going forward, in every case the mean response from those answering “yes” to the contextualising questions was higher than for those answering “no”. The mean also increased for those answering in the affirmative for the three experiential breakdowns, from 4.33 (for those familiar with crowdfunding) to 4.51 (for those respondents who had invested in REPs using crowdfunding previously) suggesting - consistent with the existence of pragmatic, experience-revealed benefits - that proximity to the process generates a more favourable disposition.

4.6 Benefits of Crowdfunding of Renewable Energy Projects

Table 7 provides evidence regarding public perceptions about the benefits of crowdfunding for REPs.[19] The results shown suggest that the main advantages are related to moral/ethical issues, with a mean response of 4.33, followed by speed (mean = 3.99),[20] signifying that both hard and soft factors are important drivers of the optimism revealed elsewhere in this study. In terms of the sub-sample results, in all five cases the highest sub-group mean was generated by those intending to invest in REPs via crowdfunding, indicating that those who intend to undertake such activity do so on the basis of a wide range of perceived benefits.

As it was not possible to list all the potential benefits of crowdfunding for REPs via a closed-ended question with pre-specified responses, those completing the survey were given the option to add further comments. Seventy-nine such responses were received.[21] Whilst the responses reveal a wide range of possibilities - confirming much of the evidence underpinning Table 7 - the

advantages mentioned most often related to community involvement (including the sense of "ownership" provided by crowdfunding vehicles) and access to funds in cases where banks are simply not likely to provide the capital needed, i.e. "seed money."

4.7 Constraints on Growth in Crowdfunding of Renewable Energy Projects

The survey then turned to the significance of three of the main difficulties relating to crowdfunding for REPs suggested by prior literature: lack of investor knowledge; the small scale of the typical crowdfunding relative to REP needs; and the lack of regulation in the sector. The results, documented in Table 8, reveal that in no cases, including for any of the sub-groups, did the mean reach a value of 4. However, the highest overall average (3.74) was generated for the statement relating to investors' lack of knowledge about funding sources, a pattern consistent across all the disaggregations. This finding indicates that whilst the picture that emerges from this study as a whole is overwhelmingly positive, there is some residual concern about the way in which awareness of platforms' existence is disseminated. The disaggregated data does suggest some grounds for optimism even in this instance though, in eleven out of twelve cases, greater familiarity/experience was associated with lower levels of concern.

As with the possible benefits of crowdfunding for REP, there was no likelihood of all potential constraints on growth in the sector being specified in the survey and so respondents were again given the chance to make additional open-ended comments. A consistent theme in the views expressed[22] relates to the lack of awareness and experience on the part of both platform providers and investors, confirming the impression from the closed-ended questions whereby this issue appears to dominate any concerns about scale or sectoral regulation.

4.8 The Future of Crowdfunding

The survey concluded by asking respondents to indicate the extent to which they believed that crowdfunding was likely to grow in the next five years, both in general and for REP projects specifically. Inspection of Table 9 reveals that growth in the use of crowdfunding is widely predicted, although the mean score for the notion in an REP context (4.22) was significantly higher than for investments in general (4.07). This pattern was repeated for eight out of the nine disaggregations of the data reflecting prior experience and familiarity; encouragingly, the four significant differences at the 5% level were generated by respondents who indicated that they were familiar with the underlying processes. As was the case elsewhere in the survey, those answering "yes" to the questions exploring respondent backgrounds tended to take a more positive viewpoint than did the "no" group; this was true in all eight instances. In addition, for the three experiential breakdowns, the mean response increased from 4.23 (for familiarity) to 4.54 (for prior crowdfunding-based investment in REPs). Overall, therefore, the data in Table 9 suggest that optimism regarding crowdfunding - in the context of renewables in particular - is pervasive across Europe with the extent of positivity being enhanced by practical experience.

After completing the survey, respondents were asked to offer any final observations and thoughts regarding crowdfunding and/or crowdfunding for REPs. A range of points were made in this context;[23] whilst one respondent refereed to the "great match" that crowdfunding and REPs represent - contrary to their disquiet about prospects for alternative financing vehicles more generally - a number of concerns were noted including: regulatory uncertainties; the need to "excite" the REP sector in the manner of the arts and culture; the potential for the sector following the global banking crisis; worries about the excessively "niche" traits of crowdfunding; lack of

investor understanding; problems with government ideology; the need for decentralisation and scalability; the potential role of tax policy in developing the market; and issues concerning REP business plans.[24] Only one comment referred to individual types of renewable project, but this individual suggested that more general factors such as the extent of local-orientation and decentralisation are the critical determinants of success when seeking funding for such initiatives, with the choice between "solar thermal, PV, wind, biomass" driven primarily by "appropriate" local resource base structure.

5. Conclusions

Just 25 years ago, few European nations could point to a renewables sector that generated 5% of gross energy consumption levels (Klaes, 2018). Whilst several member states are on target to achieve the 20% target set by the EU, the pattern has become increasingly mixed and maintaining progress will necessitate determined and coherent efforts that prioritise innovative funding approaches to rebalancing the overall energy mix (Morgan, 2020). This is particularly relevant given the impact of the global financial crisis on early-stage pre-construction investment (including the withdrawal/reduction of state-subsidies across the continent) and the implications of the Covid-19 pandemic for economic activity generally. In this context, the present study has provided the first large-scale analysis of the European public's perception of the viability of crowdfunding as an investment vehicle for REPs, outlining the opinions of 473 individuals from 30 nations. Critically - given the challenges outlined above - the empirical results represent a robust cause for optimism regarding the future. Five specific pieces of evidence in the study permit this conclusion to be drawn: First, the propensity to invest in REPs via crowdfunding was more pronounced amongst those with prior experience of this type of non-traditional financing vehicle,

but strongest of all for those who had previously invested in renewables in such a manner. Second, crowdfunding was viewed overwhelmingly as a viable alternative to traditional means of project financing - particularly for REPs and amongst those with experience in the area. Third, growth in crowdfunding was believed to be significantly more likely for REPs than for investments in general, again most strongly on the part of those with relevant prior familiarity and engagement. Fourth, crowdfunding was associated with a wide range of perceived benefits, although moral/ethical issues dominate, with speed also emerging as an important consideration. Finally, there was no evidence of any particular factor causing major worries about the employment of crowdfunding for REP. In so far as there was some concern, it related to the issue of investor awareness regarding funding sources, suggesting a priority for action, and an increased favouring of debt (over equity) where prior experience existed.

Several elements in the findings suggest that prior awareness of, and engagement with, crowdfunding - most significantly previous employment of this type of financing for renewables - leads to a greater propensity of doing so again and a strongly positive outlook regarding the sector's future. The evidence is therefore in line with the reasoning set out by Weston (1985), Minteer (1999) and Minteer and Manning (2004) that concern for environmental outcomes, far from being at odds with pragmatic impulses, is in fact demonstrably linked to the latter, with experience of crowdfunding (particularly in an REP context) generating benefits over and above any emotional/expressive/warm-glow effect.[25] Whilst the latter factors are evident here - manifesting themselves most obviously in the documented positivity extending to those with prior engagement or familiarity with crowdfunding - these are not the only benefits and those charged with overseeing progress in these funding markets should be alert to this propensity when evaluating

and nurturing future growth potential. Notwithstanding the overwhelmingly favourable picture that our study provides regarding the role of crowdfunding for renewables in Europe, there are elements in the findings that suggest some caveats. In particular, those with prior experience of investing in REPs through crowd-based vehicles favoured the apparent security of bonds - contrary to a more general preference for equity-based schemes - whilst the evident concern regarding investor awareness is likely to be important given the challenges posed by tapering off in levels of European government support for REPs.

This study has added to the growing literature on alternative financing around REPs by providing detailed evidence about potential retail investors' views. Going forward, examinations of the issues could usefully develop knowledge in the area by addressing the impact of regulatory inconsistency in the EU as the new rules designed to harmonise authorisation frameworks come into effect from 2021.[26] Also, as the first analysis of individual citizens' perspectives, we deliberately concentrated on exploring and rationalising general dispositions rather than delineating on the basis of different types of renewable project. As noted in the previous section, when we offered respondents the chance to discuss any matters not explicitly raised in the survey, project type did not feature prominently, but the specificities involved are such that as understanding in this area develops, such idiosyncrasies will require overt examination. It is also worth noting here that as global economic activity begins its recovery from the impact of the Coronavirus, the outlook for REPs is unlikely to be any less challenging than before, with heightened need for industry-wide investment funding. Importantly, our evidence suggests that the renewables sector can draw on a strongly positive perspective on the part of EU citizens regarding the role of crowdfunding in addressing any financing gaps that arise.

Notwithstanding this last point, we would like to take this opportunity to acknowledge the study's weaknesses, primarily relating to sample selection. Inevitably, the decision to complete a survey such as the one employed here requires a commitment of time, one that is less likely to be offered if knowledge of the subject area is relatively limited; this may be reflected in our inability to access a larger sample of opinions than the 473 reported on here. We would again note, however, that one of the objectives of the study was to compare viewpoints, via appropriate methodological controls, across EU citizens with varying degrees of engagement with crowdfunding - including individuals who were not aware of the notion (more than 14% of the sample) - prior to taking part. Whilst we built a test of non-response bias into the analysis the conclusions set out in the paper should be considered in the context of these complexities.

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Table 1 - Response Numbers

Language	Total Responses	Useable Responses
Dutch	51	41
German	129	95
French	146	104
English	311	233
All Versions	637	473

Note: This table details the number of survey responses in total and across each of the four language-differentiated versions

Table 2 - Prior Engagement with Crowdfunding

		Number	%
Familiar with CF		406	86.2
Previously invested via CF		181	45.5
Previously invested in REPs via CF		89	49.7
Previously invested in 1 REP		30	35.7
Previously invested in 2 REPs		15	17.9
Previously invested in 3 REPs		13	15.5
Previously invested in 4 REPs		5	6.0
Previously invested in >4 REPs		21	25.0
	Scale of most recent CF-based REP investment (€):		
	<100	9	
	100-500	29	
	500-1000	17	
	1000-5000	21	
	5000-10000	6	
	10000-25000	2	
	25000-50000	1	

Notes: This table details the extent of respondent familiarity with crowdfunding. REP(s) = renewable energy project(s). CF = crowdfunding; REP = renewable energy project.

Table 3 - Future Intentions Regarding Renewable Energy Projects

Are you planning to invest in REPs via Crowdfunding in the next three years?			
	Yes (%)	Maybe (%)	No (%)
All Respondents	40.3	50.6	9.1
Invested via CF	60.8	33.6	5.6
Invested in REPs via CF	81.3	14.7	4.0

Notes: This table reports the proportion of respondents planning to invest in renewable energy projects using crowdfunding over the next three years. CF = crowdfunding; REPs = renewable energy projects.

Table 4 – Factors Relevant to Renewable Energy Project Investment Decisions

Factor	All Respondents	Those Planning to Invest in REPs via Crowdfunding over the next Three Years
Transparency	246	101
Sustainability Impact	202	76
Expected rate of return	189	84
Investment model	184	78
Technology type	182	72
Developer reputation	152	61
Geographic location	136	52
Time frame (duration)	132	47
Information in native language	94	40
Project at development stage	60	30
Project existing and operational	56	24
Cross-border investment	30	10
Other	48	19

Notes: This table details the number of respondents indicating that particular factors were considered when undertaking renewable energy project investments. Figures for the whole sample and for only those planning to engage in such activity via crowdfunding over the next three years are shown. CF = crowdfunding; REPs = renewable energy projects.

Table 5 – Crowdfunding Method Preferences for Investment in Renewable Energy Projects

	Equity-based	Debt-based (bonds)	Debt based (p2p)	Reward-based	Donation-based
All respondents	2.46	3.01	2.85	3.26	3.81
Familiar with CF	2.54	2.98	2.83	3.31	3.78
Invested via CF	2.43	2.82	2.58	3.33	4.16
Invested in REPs via CF	2.49	2.46	2.43	3.44	4.43
Planning to invest in REPs via CF	2.45	2.47	2.77	3.43	4.20

Notes: This table reports respondents' relative preference for alternative crowdfunding methods in REP contexts. Figures shown are mean ranks (where 1 = highest; 5 = lowest). REPs = renewable energy projects; CF= crowdfunding. "p2p" = peer-to-peer

Table 6 – Crowdfunding as a Viable Alternative to Traditional Finance

		Investments in REP (n)	Investments in General (n)	Difference
All Respondents		4.32 (303)	4.11 (300)	0.21***
Familiar with CF	Yes	4.33 (274)	4.12 (272)	0.21***
	No	4.21 (29)	4.00 (28)	0.21
Invested via CF	Yes	4.41 (137)	4.20 (135)	0.21**
	No	4.25 (135)	4.04 (134)	0.21***
Invested in REPs via CF	Yes	4.51 (73)	4.28 (72)	0.23***
	No	4.32 (69)	4.13 (69)	0.19
Planning to Invest in REPs via CF	Yes	4.62 (124)	4.28 (123)	0.34***
	No	3.80 (25)	3.96 (25)	-0.16
	Maybe	4.17 (151)	3.99 (149)	0.18**

Notes: This table summarises views concerning the viability of crowdfunding as an alternative to tradition al financing vehicles. Figures shown are mean values where 5 = strongly agree; 1 = strongly disagree. REPs = renewable energy projects. CF = crowdfunding. A */**/*** indicates a significant difference at the 10%/5%/1% level respectively on the basis of a two-tailed Mann-Whitney test.

Table 7 – Benefits of Crowdfunding of Renewable Energy Projects

		Reduction in European Public Funding	Decreases in European Bank Lending	Speed of Access to Funds	Cost Relative to Traditional Financing	Moral / Ethical Basis
All Respondents		3.39	3.70	3.99	3.80	4.33
Familiar with CF	Yes	3.36	3.67	3.99	3.83	4.38
	No	3.68	3.96	3.96	3.57	4.19
Invested via CF	Yes	3.36	3.77	3.98	3.77	4.39
	No	3.34	3.57	4.02	3.89	4.33
Invested in REPs via CF	Yes	3.21	3.78	4.00	3.68	4.37
	No	3.51	3.72	3.87	3.80	4.43
Planning to Invest in REPs via CF	Yes	3.41	3.84	4.19	3.90	4.50
	No	3.04	3.36	3.57	3.70	3.83
	Maybe	3.45	3.65	3.93	3.79	4.32

Notes: This table summarises views about the potential benefits of crowdfunding for renewable energy projects. Figures shown are mean values where 5 = strongly agree; 1 = strongly disagree. REPs = renewable energy projects. CF = crowdfunding.

Table 8 – Constraints on Growth in Crowdfunding of Renewable Energy Projects

		Investors' Lack of Knowledge about Funding Sources	Small Scale of Typical CF Relative to REP Needs	Lack of Regulation in the CF Sector
All Respondents		3.74	3.11	3.14
Familiar with CF	Yes	3.72	3.10	3.10
	No	3.96	3.21	3.46
Invested via CF	Yes	3.65	3.05	3.05
	No	3.78	3.16	3.16
Invested in REPs via CF	Yes	3.63	3.06	2.97
	No	3.70	3.06	3.16
Planning to Invest in REPs via CF	Yes	3.68	2.94	2.97
	No	3.87	3.61	3.00
	Maybe	3.77	3.15	3.27

Notes: This table summarises views about possible constraints on growth in crowdfunding for renewable energy projects. Figures shown are mean values where 5 = strongly agree; 1 = strongly disagree. REP(s) = renewable energy project(s). CF = crowdfunding.

Table 9 – Is Crowdfunding Likely to Grow Over the Next Five Years?

		Investments in REP (n)	Investments in General (n)	Difference
All Respondents		4.22 (298)	4.07 (300)	0.15***
Familiar with CF	Yes	4.23 (270)	4.10 (272)	0.13***
	No	4.11 (28)	3.75 (28)	0.36*
Invested via CF	Yes	4.42 (132)	4.21 (134)	0.21**
	No	4.04 (134)	3.99 (134)	0.05
Invested in REPs via CF	Yes	4.54 (70)	4.30 (71)	0.24**
	No	4.24 (68)	4.06 (69)	0.18
Planning to Invest in REPs via CF	Yes	4.55 (120)	4.22 (122)	0.33***
	No	3.52 (23)	3.88 (24)	-0.36
	Maybe	4.09 (151)	4.00 (150)	0.09

Notes: This table summarises views about the likelihood of growth in crowdfunding over the next five years. Figures shown are mean values where 5 = strongly agree; 1 = strongly disagree. REPs = renewable energy projects; CF= crowdfunding. A */**/*** indicates a significant difference at the 10%/5%/1% level respectively on the basis of a two-tailed Mann-Whitney test.

Endnotes

[1] Plus a small number of 'other' related vehicles, including community shares, pension-based financing and crowd-based microfinancing, representing 0.67% of total volume (Ziegler et al., 2019).

[2] E.g. Chemla and Tinn (2016) who outline the circumstances in which real-options can mitigate against moral hazard excesses in reward-crowdfunding.

[3] Although Walker et al. point out that this drive on the part of UK authorities did not represent evidence of any broader shift in policy approach.

[4] See also Cass and Walker (2009).

[5] Organised as part of the CrowdFundRES project. The project, involving a consortium of EU-based platforms, renewable energy project providers, academics and legal firms, was designed to explore the potential of crowdfunding to generate significant growth in renewable project investment levels.

[6] This pilot process lasted two weeks, during which time 32 responses were received; analysis of these suggested that only minor modification were required and the survey was then translated into Dutch, French and German. A copy of the survey is available on request from the authors.

[7] See Bush (2018).

[8] Given the (deliberately) unstructured nature of the sample selection method, non-response bias has the potential to limit the validity of any generalisation from the results presented. In this context, Hussey and Hussey (1997) suggest that comparison between early and late responses provides a useful empirical measure of any such bias (see also Wallace and Mellor, 1988). It therefore appears reasonable to assume that answers to the questionnaire were not systematically linked to the propensity or willingness to respond.

[9] The full results are available from the authors on request.

[10] i.e. benefits relating to the issue of "how does something make me feel?" (Statman, 2017, p. 18).

[11] i.e. benefits addressing the question of "what does something say about me to others and to me?" (Statman, 2017, p. 18).

[12] Removal rates varied somewhat across the languages used to complete the questionnaire, from 19.6% for the Dutch version to 28.8% for the French.

[13] Although not shown in the table, the other demographic information collected suggested that diversity in gender and age was also reflected in the sample, with 33% (67%) of respondents who provided the information being female (male) whilst (again amongst those who offered the information), 2 respondents were aged under 18, 44 were aged 18-25, 147 were aged 26-45, 90 were 46-67 and 5 were over 68. In terms of the three questions relating to familiarity with crowdfunding/REPs, age did not appear to have a major impact on the responses, although while 16% of those familiar with crowdfunding were under 25, only 13% (10%) of those who had previously invested via crowdfunding (previously invested in REPs via crowdfunding) were in this age group. A stronger pattern was observable in terms of the breakdown according to gender. While 33% of those who were familiar with the crowdfunding notion were female, this was true of only 22% of those who had made prior use of such platforms and just 16% of those who had undertaken REP investments in this manner. This evidence provides a further indication of the male domination of the renewables sector (see Amin, 2019), in this case one that extends to engagement with alternative financing vehicles. As Amin notes, attempts to maximise the sector's growth potential will be compromised until efforts are made to: "tap a wider pool of talent - notably that of women, who have been largely underrepresented, depriving the energy transition of critical capacities" (p. 3). Information regarding income levels was also sought, but participants chose not to provide this data. In contrast, around 15% of those who completed the survey did provide information regarding professional qualifications; these ranged from a panoply of business and technological attestations, to dentistry and culinary awards. Full details on all these findings are available from the authors on request.

[14] The set of twelve factors included in this part of the survey document was not intended to represent an exhaustive list, but was based instead on a desire to reflect the issues most commonly referred to in the REP literature (see, for example, Terrapon-Pfaff et al., 2014; Sen and Ganguly, 2017).

[15] Details are available from the authors on request.

[16] Equity-based crowdfunding involves situations where individuals contribute to project funding on the basis of the right to receive a formalised share of financial gains. In contrast, reward-based schemes provide return in the form of non-financial recompense, typically linked to the success of the underlying projects(s). Donation-based arrangements involve no returns or gifts of any type, but are instead funded on the basis of support for a project's underlying values and ethics. The debt financing format involves individual borrowers accessing funds directly from lenders (typically brought together via a dedicated on-line facilitator) outwith developed stock markets, in the form of unsecured loans

(peer-to-peer; "p2p") or via the issue of bonds. See Aschenbeck-Florange and Dlouhy (2015) and Ziegler et al. (2019). Ziegler et al. also report significant use of real-estate crowdfunding but this vehicle has little relevance to a study focussing on REP investments and so was excluded here. The choice of methods to include in the questionnaire was also influenced by detailed discussion amongst the consortium members (see note 5) regarding suitable terminology for inclusion in a research instrument to be used on a Europe-wide basis, where language and technical differences imply that some generalisation is required. In particular, the precise terminologies used around debt vehicles differ across Europe, but most arrangements have dominant characteristics that permit the categorisation employed here. Regulatory bases around Europe vary, even regarding the extent to which the EU's MiFID rules are applied to crowdfunding arrangements (see Aschenbeck-Florange and Dlouhy, 2015 where a country-by-country review of regulation across the EU is provided). It was not, therefore, felt appropriate to solicit views on regulatory specificities in the survey although, as noted elsewhere, the survey document provided respondents with the opportunity to reflect on any issues of particular note that were not addressed in the questionnaire. Comments made regarding regulation did not generally refer to national idiosyncrasies, but instead suggested the importance of suitable governmental approaches in developing the relevant statutes. See note 24 below.

[17] Details are available from the authors on request.

[18] As Wu (2007) notes, Likert scale data such as that obtained in the present study do not typically follow a normal distribution; the significance results reported in the tables are therefore based on non-parametric (Mann-Whitney) analysis. However, the pattern of significance was very similar when parametric analysis was performed; the latter results are available from the authors on request.

[19] As with Table 4, the factors chosen for inclusion in this part of the survey were not meant to be exhaustive, but instead to reflect issues prominent in recent literature in the area.

[20] Suggesting that public views regarding the importance of this factor coincide with those of platforms specialising in alternative financing for REPs (Nigam et al., 2018).

[21] Details are available on request.

[22] Details are available on request.

[23] Details are available on request.

[24] In several cases, those making comments also agreed to follow-up by the research team and so a sample of five cases where the views expressed seemed broadly representative of the full sample - but with the potential to benefit from further elucidation - were selected for analysis. Two of those approached offered further direct comment. In one case, the respondent focussed on the potential role of crowdfunding of REPs in a developing country context given the small-scale (relative to normal corporate projects) of the funding, with the result being a "nicely-packaged solution" for emerging nations. The second respondent who provided additional opinions made detailed representations concerning the adverse impacts of the replacement in the UK of the Financial Services Authority by the Financial Conduct Authority. The latter, in this individual's opinion, was much less supportive of co-operative status being granted to energy projects. This comment suggests the need for caution and careful observation of regulatory bodies' actions amid increasing uncertainty regarding governmental support of non-standard business funding models.

[25] In terms of the language inherent to Pierce's "pragmatic maxim" our interpretation of the evidence adopted in the discussion coheres most closely with the indicative conditionals adopted in Pierce's early work, rather than the subjunctives employed in his later writing (see Hookway, 2004). For example, we contend that one reason for crowdfunding being seen as highly appropriate for REPs is because those who have prior experience *do* exhibit greater positivity than those who have not, rather than predicting that those who have this type of familiarity *would* express such opinions.

[26] See ECN (2019).